

# Rethinking Radiation 60 Years after Hiroshima

Dr. Rosalie Bertell, May 4, 2005

- I. As we look at the horrendous nuclear explosion, we need to begin to take into account the incredibly high temperature of the inferno and the destructive effects of the blast wave. Look at the size of the mushroom cloud against the distant Nevada mountain. See the angry, dirty clouds of debris at the foot of the mushroom, being sucked up into the cloud.
2. The heat of the jet fuel fire in the Twin Towers of the World Trade Centre was estimated to be 2000 degrees Centigrade; a DU "metal fume" reaches 3000 to 6000 degrees Centigrade, the surface of the sun is 6000 degrees Centigrade, the leading edge of a nuclear blast is 60,000 degrees Centigrade and the inner core of the nuclear bomb is 400,000 degrees Centigrade. A TNT fire 575 degrees Centigrade, one hundred times less intense than the surface of the sun or a uranium fire.
3. This heat of burning uranium is sufficient to melt and sublime any of the materials we are familiar with in our everyday life, including iron, aluminum and steel. These metals and other debris are made gaseous and raised into the mushroom cloud. When they move away from the burning gaseous fire, they slowly re-solidify into extremely small ceramiclike aerosols. These can be breathed in with disastrous consequences.
4. These are pictures, which the U.S. Department of Energy took at the Nevada Test Site, of houses destroyed by a nuclear blast. This picture shows the house before the blast, and at the beginning of the nuclear fire.
5. This shows the well advanced fire and wind which completely demolished the house, leaving smaller and smaller pieces or slivers. Many pieces were sublimated and drawn into the mushroom cloud. Two key parts of a nuclear blast are important for understanding the health implications of a radiation bomb: the division of the pieces into extremely small particles, and the fact of being "fired" in heat greater than in a pottery kiln.
6. Pieces less than 10 microns in aerodynamic diameter (i.e. less than the width of a human hair, are respirable. The larger ones, between 10 and 2.5 micron, will stay in the upper respiratory system (nasopharyngeal area) and those smaller than 2.5 micron can penetrate into the deep lung.
7. Whatever reaches the deep lung has no way out except through the lung-blood barrier into the blood stream, or being scavenged into the thoracic lymph nodes, where it will stay for the rest of the person's life. Nanometer size particles easily move from the lung into the blood stream, and can travel all through the body. They are able to pass through the blood-brain barrier and also cross the placenta to contaminate an embryo or fetus.
8. The radiation dose from these particles is determined by two factors: distance from the source of radiation, and length of time spent in the radiation field. Increasing distance from the source of the radiation reduces the dose, but when a particle is in the body, the distance to the source is zero. A contact dose is received.

9. The length of time the particles are in the body also affects the dose received, like sitting in the sun. The dose depends on how long you sit in the sun, or how much shielding you have. Radioactive particles which have been sublimated, and aerosolized by the heat of a nuclear explosion are like ceramics. They are not soluble in body fluid. It is by dissolving substances that the body manages to excrete them either in sweat or in urine.
10. After dropping the bombs on Hiroshima and Nagasaki, the physicists who developed the bomb also sought to determine the health effects. They were concerned with each detail of the type of radiation, the placement of the radioactive material (inside or outside of the body), determination of duration of exposure and shielding, and whether the material settled in one organ (like the thyroid) or exposed the whole body. They also studied the pathways to humans in great detail. They studied the plume and its path through the atmosphere, the fallout, the uptake by plants and animals, and the chemical behavior in the body.
11. With respect to the "Host Response", what happened to the people, they focused on an endpoint which they considered to be both important and easy to count: fatal cancers. They have given the impression that this is the ONLY effect of exposure! Fatal cancer is not an easy-to count endpoint since it is influenced by the age and health of the person at time of diagnosis, stage of the cancer at diagnosis, and whether or not it was diagnosed before death. This model, drawn up by physicists persists to this day in the "scientific methodology" of the International Commission on Radiological Protection (ICRP).
12. How would medical doctors have approached the health effects of exposure to radiation? What can we say about the chronic illnesses which have plagued the atomic bomb survivors for the past 60 years? We can learn something from the suffering of the veterans of the first Gulf War, an illness called Gulf War syndrome. This slide shows some of the major complaints of the GW Veterans and those of A-bomb Survivors in 1994 (data of Dr. Katsumi Furitsu), against the complaints of veterans who were not deployed to Iraq in 1991. You can see the similarity between the two exposed groups. Katsumi found the same pattern when she compared the A-bomb survivors with the general Japanese population.
13. How could this generalized ill health have happened? Remember the two characteristics which I think have been forgotten: the radioactive particles are very small and are not soluble in body fluid. Uranium reacts with phosphates in tissues. There are other minute particles of various metals, with new and unknown compounds fanned in the heat of the A-bomb. These will also be non-soluble in the human body fluid, and can react biochemically with living tissue. Everyone has experienced a splinter! Imagine hundreds or millions of them ingested or inhaled from the atomic debris! These health problems reflect (I think) the body coping with radioactive and toxic metal debris.
14. This debris damages the blood, respiratory, and nervous system, as well as reproductive experience and health of offspring. A medical approach (rather than one of a physicist) would have dealt with these long term problems and not been obsessed with only fatal cancers.
15. These illnesses are reported in the International Labor Organization Encyclopedia of Occupational Health as related to chronic uranium exposure. Internal uranium particles give a chronic exposure because of their long biological half-time.

16. An inflammatory reaction to foreign bodies is a classic response of the human body to inhaled and ingested inorganic debris. This is similar medically to response to a hip prosthesis which decays and releases particles into the body, or silicon breast implant, or dental fillings which release their material into the body.
17. The only therapy I know of which will mitigate this situation is the use of distilled water for all drinking. This will leach some of the inorganic debris out of the tissues and hopefully out of the body. It will not remove needed organic minerals, and is safe for even pregnant women. Perhaps if doctors will put their skill toward the true problem of radiation exposure in violent circumstances, they will discover better healing protocols!
18. I suggest that we pressure the U.N. to place radiation health questions under the guidance of the World Health Organization, rather than the International Atomic Energy Organization. It is also important to ask each nation to affirm their understanding of the Treaty prohibiting all toxic gas use in war. It is already illegal, but some nations do not understand this!